

was broken by the copious rains at the close of the month. The drought has been of unusual severity and has caused much injury to crops, but wheat, oats, and corn were greatly revived by the rains.

Mississippi.—Vicksburg: a heavy rain began in the early morning and ended at 8.25 a. m. on the 4th. Reports from the surrounding country show that this rain was general, breaking the long-continued drought. Crops were in such condition that had the drought continued for another week the result would have been disastrous.

Nebraska.—Brownville, Nemaha Co.: the drought in this section was broken by the rain of the 10th.

Omaha: the rainfall throughout Nebraska during the night of the 12-13th was of great benefit to the crops which, at that time, were beginning to suffer from drought.

New Jersey.—The "New York Sun" of May 21st contained the following: "The drought is getting to be serious in New Jersey. Small seeds do not germinate, and kitchen gardens are being replanted, and in some cases planted for the third time. Extensive raisers of garden truck place hay about their plants to retain what moisture is collected at night. Grain is rushing into head before its time. It will not fill, and the straw will be short. It is feared that early small fruits will be almost a failure. Wells are dry, and springs that were never known to fail before are without a pint of water. The hauling and peddling of water in barrels is already a part of the season's work."

New York.—Humphrey, Cattaraugus Co., 22d: the crops are suffering for want of rain; the streams are very low.

New York City, 25th: the surrounding country is suffering from severe drought; on the 26th 0.35 inch of rain fell, which was much needed in this section.

Factoryville, Tioga Co.: from the 1st to the 24th no appreciable amount of rain fell, and the roads were very dry and dusty; from the 24th to the 31st the rainfall amounted to 1.82 inches.

North Carolina.—Reidsville, Rockingham Co., 31st: previous to the 6th wheat, oats, and corn suffered from drought, but were greatly improved by subsequent rains.

Ohio.—Wauseon, Fulton Co.: the drought was broken by the rain of the 23d and 24th. The spring season in this vicinity has been the driest for the last fifteen years.

Tiffin, Seneca Co.: a much needed rain fell in this vicinity on the 30th.

Pennsylvania.—Quakertown, Bucks Co., 26th: the drought up to this date has not injured vegetation in this locality, but the streams and wells are low, and cisterns are dry; some people are hauling water for domestic use, etc.

South Carolina.—Kirkwood, Kershaw Co., 31st: in this immediate neighborhood the rainfall has been insufficient for the crops, but in this county, generally, the crops are very promising.

Texas.—A special dispatch from Laredo, Tex., to the "Saint Louis Globe-Democrat" on the 18th stated that the rain of that date was the first of any consequence that had fallen at Laredo in eight months.

Wisconsin.—La Crosse, 31st: the month was characterized by the drought which prevailed from April 23d, and which was only broken by light rains on the last few days of the month. The total precipitation for the month was 0.50 inch, the least that has been recorded for this month since the establishment of the signal station here.

Delavan, Walworth Co., 31st: the protracted drought was broken on the 22d by a heavy rainfall.

WINDS.

The most frequent directions of the wind during May, 1887, are shown on chart ii by arrows flying with the wind; in the lower lake region and Ohio Valley they were from the north-east; in the Gulf States, and along the Atlantic coast, from southeast to southwest; in the upper Mississippi valley, upper lake region, north Pacific coast, and Rocky Mountain regions, variable; in California, from the west or southwest.

HIGH WINDS (in miles per hour).

Wind-velocities of fifty or more miles per hour, (on mountain stations at or exceeding 70 miles) other than the maximum velocities for the month, which are given in the table of miscellaneous data:

Fort Totten, Dak., 51, n., 29th.

Valentine, Nebr., 50, nw., 1st.

Mount Washington, N. H., 78, nw., 1st; 77, nw., 4th; 86, nw., 12th.

Pike's Peak, Colo., 70, sw., 1st.

LOCAL STORMS.

Pittsburg, Penn.: a violent wind and rain storm occurred during the afternoon of the 5th along the Pennsylvania Railroad, about forty-five miles east of Pittsburg. Considerable damage was done to the bed of the Ligon Valley Railroad; trains were delayed for several hours.

Columbus, Ohio: a thunder-storm, with heavy rain and high wind, set in about 6 p. m. of the 5th; maximum velocity of the wind thirty-two miles per hour, from the south. The storm did considerable damage in different parts of the city. A church steeple, and numbers of trees, sheds, and fences were blown down. Severe thunder-storms occurred also on the afternoon of the 22d and 23d; the storm of the 22d was accompanied by hail, which did some damage to vegetation. On the 23d the electrical part of the storm was intense, the lightning being vivid and incessant.

Buffalo, N. Y.: on the night of the 5-6th a severe thunder-storm prevailed from 10 p. m. until 3 a. m. and did considerable damage in this city and vicinity. The lightning was vivid and almost continuous; several buildings were struck of which three were burned, and the remainder slightly injured. A destructive thunder-storm, accompanied by heavy rain, occurred also on the 7th.

New York City, 6th: much damage was done by lightning in the northern and western portions of New York on this date. Reports from Binghamton, Broome Co., Livonia, Livingston, Co., and Canajoharie, Montgomery Co., give accounts of dam-

age done at those places. At Canajoharie buildings valued at \$12,000 were destroyed.

Abilene, Tex.: on the night of the 8-9th a thunder-storm, with hail and high wind, occurred; from 1.30 to 1.45 a. m. the wind blew at the rate of fifty-two miles per hour, but did very little damage; this is the highest velocity the wind has reached since this station was established in 1885. A thunder-storm, with hail, prevailed from 6.45 to 8.50 p. m. of the 9th.

Weldon, Halifax Co., N. C., 10th: light rain fell from 10 a. m. to 12.30 p. m., when it increased to a heavy rain, which from 1 to 4 p. m. fell in torrents; after 4 p. m. light rain continued until about midnight. During this time more than six inches of rain fell. The meteorological record at this place extends back fifteen years and this is the heaviest rainfall for that period.

Washington, Wilkes Co., Ga.: about 5 p. m. of the 11th a violent wind, rain, and hail storm occurred in this vicinity. A number of buildings were either blown down or unroofed, and many trees prostrated. The hail caused much damage to crops.

Omaha, Nebr.: during the evening of the 13th a severe wind and rain storm prevailed in eastern Nebraska. In this city several small houses were wrecked and lumber piles scattered.

Frederick, Brown Co., Dak.: A severe southwesterly gale began at this place at about 6 p. m. of the 14th; considerable damage was done to lightly constructed buildings.

Petoskey, Emmet Co., Mich.: during a severe wind-squall at 11.30 a. m. of the 22d, a yacht was capsized on Little Traverse Bay, and six persons were drowned.

Delevan, Walworth Co., Wis.: a heavy rain storm occurred on the 22d; the rain fell in torrents and was accompanied by very high winds which did damage to fences and shade trees.

Wakefield, Clay Co., Kans.: during the thunder-storm of the 22d small out-buildings and fences were prostrated, and one house unroofed.

Clay Centre, Kans.: at Idana, eight miles west of this place, a severe wind storm prevailed at about 6.30 p. m. on the 23d. A number of dwellings and a school-house were blown down, and several railway cars were blown from the tracks.

Montgomery, Ala.: a destructive thunder-storm passed over this city between 2.47 and 3.40 p. m. of the 24th. Rain fell from 3.08 to 4.04 p. m. At 3.10 p. m. the wind suddenly increased from a velocity of ten miles per hour to gale force, blowing for a short time at the rate of forty-seven miles per

hour, accompanied by hail and heavy rain. The wind damaged fences and roofs to the extent of \$3,000.

Wetumpka, Elmore Co., Ala.: a severe wind and rain storm occurred here on the 24th, causing much damage to buildings, fences, and trees. This storm was also severe in Lee and Dallas counties.

Rio Grande City, Tex., 29th: the heavy rain accompanying the thunder-storm of this date caused the river to rise suddenly; considerable damage was done to crops, and many domestic animals were drowned. The wind during the storm was very heavy, blowing down frail buildings and fences.

Chattanooga, Tenn.: shortly after 4 p. m. of the 30th a thunder-storm, moving from south to north, set in and continued with great violence until after midnight. From 5 to 8 p.

m. the storm gradually changed its direction of progress, and at the latter hour was moving from the east, accompanied by heavy rain, violent gusts of wind, vivid lightning, and for eight minutes by hail. The wind, together with the rain, hail, and lightning, injured telephone, electric light, and fire-alarm wires, and blew down a number of trees, signs, etc.; highest velocity of the wind, thirty miles per hour, at about 8 p. m. During the evening the barometer rose rapidly, a rise of .14 inch occurring between 7.55 and 8.10 p. m. A severe thunder-storm, with hail, occurred on the afternoon of the 10th, during which a building was struck by lightning and one person injured. On the afternoon of the 22d the lightning was unusually vivid and the rainfall heavy; several buildings were struck and one person killed by lightning.

Report of tornadoes for the month of May, 1887, by Lieut. John P. Finley, Signal Corps, U. S. Army, Assistant.

Place.	Date.	Time.	Direction.	Form of cloud.	Number of persons killed.	Number of persons wounded.	Width of path in feet.	Number and kind of animals killed.	Number and kind of buildings destroyed.	Total valuation of property destroyed.	Authority.
Fergus Falls, Minn.	1	4.30 p. m.	e.		None	None			Several barns		Saint Paul "Pioneer Press."
Neillsville, Wis. a	1	9 p. m.	ne.		None	None					I. T. Carr, Neillsville, Wis.
Johnstown, Dak.	1				None	None			Trees prostrated and crops damaged.		I. N. Johnson, Johnstown, Dak.
Rollag, Minn. b	1		se.	Funnel	None	None			A large number of houses and barns destroyed; trees and fences prostrated.		W. Middagh, Rollag, Minn.
Milltown, Wis.	1	6 p. m.	ne.		None	None			Telephone and telegraph wires prostrated, several houses unroofed, and trees broken.	\$15,000	F. H. Rasmussen, El Salem, Wis.
Saint Paul, Minn. c	1	6 p. m.	ne.						School-house destroyed, buildings unroofed, fences prostrated.	1,500	Saint Paul "Pioneer Press."
Wauseon, Ohio e	2	12.35 p. m.	n. 20° e.	Funnel	1	7	40		Fences and out-buildings blown down.		Thos. Mikesell, Wauseon, Ohio.
Vanlue, Ohio	2	3.30 p. m.	ne.		None	None	2,640 to 3,960		Fences and trees prostrated.		W. Alsapach, Vanlue, Ohio.
Personville, Tex. d	2	4 p. m.	ne.						Very destructive		J. F. Boyd, Personville, Tex.
Somerset county, Pa. e	3	Evening	easterly		None	None			Crops, trees, and out-buildings damaged.		W. M. Hill, Baird, O. M. Irvine, Duncansville, R. C. Hefley, Berlin, Pa.
Bedford county, Pa. e	3	Evening	ene.		None	None			Very destructive		S. A. Hamilton, Roaring Spring, G.
Blair county, Pa. e	4	Evening	ne.		None	None	1,320	None	Largo trees twisted off and crops destroyed.		Hoover, Hooversville, G. W. Gump, Napier, Pa.
Somerset county, Pa. f	4	6 p. m.	ne.		None	None	1,320	None	Very destructive		David Burris, Big Lick, N. C.
Bedford county, Pa. f	4	6 p. m.	ne.		None	None	Several	None	Much damage to buildings, stock, crops, &c.		W. P. Hunt, Eden Centre, N. Y.
Big Lick, N. C. g	6	3.30 p. m.	ne.		None	None			Great damage to crops.		G. Bradley, Ozene, Ark.
Eden Centre, N. Y. h	7	1.30 p. m.	ne.		None	None	Narrow		Considerable damage to property.		Rev. C. M. Widman, S. J., Grand Co., La.
Johnson county, Ark.	10	4.30 p. m.	ne.	Funnel	None	None	Narrow		Totally destroyed school-house, and badly damaged 2 stores, 2 churches, and several dwellings and out-buildings.		S. B. Knapp, Gilmore, R. L. Carpenter, Papillon, Nebr.
Bello Place, La. i	10	Evening	ne.	Funnel	None	None					J. Guitard, Barneston, W. J. Dunnick, Lanham, D. Patterson, Wymore, Nebr.
Gilmore, Nebr. j	13	5.25 p. m.	ne.	Funnel			Narrow				
Blue Springs, Nebr. k	13	4.30 p. m.	ne.	Funnel	1	1	200				
Kansas City, Mo. l	13	10.30 p. m.	e.	Funnel	None	None					A. Schmitt, Le Roy, Kans.
Near Colony, Kans. m	16	2 a. m.	ne.	Funnel	None	None	Narrow	17 cattle			E. Blair, Cadmus, Dr. G. W. Haines, La Harpe, Kans.
Sun Dance, Wyo.	20		ne.	Funnel	None	None	1,320		Trees prostrated.		G. A. Teel, Sun Dance, Wyo.
Idana, Kans. n	22	6.45 p. m.	ne.	Funnel	None	None			Destroyed school-house.		C. N. Smith, Idana, I. D. Graham, Manhattan, Kans.
Lisbon, Dak. o	23	11.30 a. m.	se.	Funnel	None	None	10,560		Orchards and crops damaged.		B. B. Breed, Lisbon, Dak.
Altamahaw, N. C. p	25	3.30 p. m.	ne.	Funnel	None	None	2,640		No buildings in path.		A. T. Smith, Altamahaw, N. C.
Hiattville, Kans. q	28	3 p. m.	ne.	Funnel	None	None			Great damage to crops by hail; fences and out-buildings blown down and trees broken off.		E. Blair, Cadmus, Kans.
Fredonia, N. Y.	30	5 p. m.			None	None	5,280		Trees, fences, roofs, and small buildings.		E. F. Southwick, Fredonia, N. Y.
Loganville, Ohio	30	12.45 p. m.	ne.	Funnel	None	None					Lewis Huddle, Logan, Ohio.

a Heavy black cloud, accompanied by a terrific roar.

b Cloud did not seem to point to the earth, but rather lay on its side with the end of the funnel to the southeast.

c A large black cloud fringed with gray, ominous "shell caps."

d A dark, blue looking cloud with a white streak under it appeared in the west, moving rapidly.

e Cloud accompanied by a roaring noise.

f A dark bank of clouds with an opening in the centre, the edge of which hung down like the bottom of a ragged curtain, moving rapidly, with a terrific roar.

g Cloud very dark and thick, with white racks like smoke over the cloud.

h Cloud very low and moved at a rapid rate with a heavy roar.

i Large dark clouds were seen at a great height, when a column of spray gradually rose to an elevation that rendered it distinct to the whole country; it appeared like a great column

of smoke, which soon connected with the clouds; the column broke twice, but each time reunited.

j A dark, funnel-shaped cloud, moving at a terrific pace.

k Two funnel-shaped clouds, very dark and dense.

l Dark and decidedly ominous looking funnel-shaped cloud, with a sort of eddying movement.

m The clouds had concentrated in a dense, dark mass, from which projected a long black arm, apparently but a few feet in diameter, swaying in graceful curves almost to the earth.

n Appeared like a great icicle pointed at the end and connected with a black cloud, having a diameter of several hundred feet.

o Had the appearance of a water-spout and accompanied by a noise like the roaring of the ocean.

p A small, narrow cloud, apparently not over half a mile in width, almost square on either side, with a long tail of a whitish color tapering to a point, moving rapidly.

q A black, conical cloud which did not seem to reach the earth, but twisted off the tops of trees.

r A very heavy, angry looking, black cloud first appearing in southwest.

s A very black cloud, shaped like a balloon.

WATER-SPOUTS.

Mr. James Mainwaring, observer on the s. s. "Athos," Capt. Horatio Law, commanding, reports having observed several water-spouts off the east end of Jamaica, W. I. on May 18, 1887.

Capt. W. N. Aldrich, of the schooner "Comet," reports water-spouts as follows: May 18th, N. 22° 08', W. 94° 40', one

small one; 28th, N. 25° 07', W. 86° 05', three within half an hour; 29th, N. 24° 15', W. 85° 25', two in northeast and one in southeast.

Captain Garvie, of the s. s. "Caledonia," reports having observed a large water-spout in N. 38° 30', W. 17° 0', on May 29th.

COTTON REGION REPORTS.

In the following table are given the means of the maximum and minimum temperatures, and the average rainfall for the cotton-belt districts during the month. For the purpose of comparison the means for the four preceding years are also given. The district of Wilmington, only, shows an excess of precipitation, 1.10 inches above the normal; all the other districts have deficiencies, ranging from 0.22 inch for the district of Mobile to 2.81 inches for the district of Memphis. The district of Wilmington shows the greatest average precipitation for the month, 4.81 inches, and the district of Memphis the least, 1.88 inches.

The means of the maximum and minimum temperatures are in all districts above the normal; the departures of the maximum temperature ranging from 2° 1 for the district of Savannah to 6° 4 for the district of Memphis, and the departures of the minimum temperature from 0° 4 for the district of Charleston to 5° 1 for the district of Little Rock. The district of Galveston shows the highest maximum temperature for the month, 101° 0, and the district of Vicksburg the lowest minimum temperature, 30° 0.

Temperature and rainfall data for the cotton districts, May.

Districts.	Rainfall.			Temperature.								Extremes for May, 1887.	
	Average for May of four preceding years.	Average for May, 1887.	Departures.	Maximum.			Minimum.						
				Mean for May of four preceding years.	Mean for May, 1887.	Departures.	Mean for May of four preceding years.	Mean for May, 1887.	Departures.				
									Max.	Min.			
	Inch.	Inch.	Inch.	°	°	°	°	°	°	°	°	°	°
New Orleans...	5.46	4.13	- 1.33	83.7	88.3	+ 4.6	62.6	63.6	+ 1.0	100	44		
Savannah.....	3.12	2.44	- 0.68	85.5	87.6	+ 2.1	62.0	53.6	+ 1.3	100	43		
Charleston.....	3.46	3.55	- 0.91	83.5	86.3	+ 3.0	59.4	59.8	+ 0.4	94	44		
Atlanta.....	3.02	2.65	- 0.37	80.3	85.2	+ 4.4	56.5	59.4	+ 3.1	98	44		
Wilmington...	3.71	4.81	+ 1.10	80.9	83.1	+ 2.2	56.1	60.0	+ 3.9	97	43		
Memphis.....	4.69	1.88	- 2.81	79.9	85.7	+ 6.4	56.4	60.5	+ 4.1	97	40		
Galveston.....	6.53	4.53	- 2.00	83.5	87.2	+ 3.4	62.1	63.5	+ 1.4	101	38		
Vicksburg.....	5.79	3.95	- 1.84	82.6	87.4	+ 5.4	61.1	61.5	+ 0.4	99	30		
Montgomery...	3.23	2.88	- 0.35	83.5	86.8	+ 3.3	58.8	63.0	+ 4.2	97	46		
Augusta.....	3.17	2.52	- 0.65	83.3	86.6	+ 3.3	58.8	59.9	+ 1.1	97	41		
Little Rock.....	5.65	4.05	- 1.60	79.6	83.9	+ 4.3	55.3	60.4	+ 5.1	97	35		
Mobile.....	3.96	3.74	- 0.22	82.5	87.8	+ 5.3	60.1	62.2	+ 2.1	98	43		

INLAND NAVIGATION.

STATE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the various river stations and the highest and lowest depths for May, 1887, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, May, 1887.
[Expressed in feet and tenths.]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La.....	29.9	21, 22, 23	16.7	2	2.7	14.0
Arkansas River:						
Fort Smith, Ark.....	22.0	7	9.0	16, 17	3.2	5.8
Little Rock, Ark.....	23.0	6	16.5	3	4.4	12.1
Missouri River:						
Omaha, Nebr.....	18.0	24	9.8	2 to 8	7.6	2.2
Leavenworth, Kans.....	20.0	25	12.3	8	9.0	3.3
Mississippi River:						
Saint Paul, Minn.....	14.5	1, 2	5.8	31	3.4	2.4
La Crosse, Wis.....	24.0	1	10.3	31	5.0	5.3
Dubuque, Iowa.....	16.0	1	13.7	31	5.8	7.9
Davenport, Iowa.....	15.0	1	11.1	31	4.3	6.8
Keokuk, Iowa.....	14.0	2, 3, 4	11.0	31	4.7	6.3
Saint Louis, Mo.....	32.0	7	18.4	25	14.6	3.8
Cairo, Ill.....	40.0	2	39.3	31	17.6	21.7
Memphis, Tenn.....	34.0	5	31.6	31	15.2	16.4
Vicksburg, Miss.....	41.0	14, 15	38.2	31	25.9	12.3
New Orleans, La.....	13.0	19	12.5	31	10.2	2.3
Ohio River:						
Pittsburg, Pa.....	22.0	1	10.7	23	2.2	8.5
Cincinnati, Ohio.....	50.0	2	35.0	31	9.8	25.2
Louisville, Ky.....	25.0	1, 2, 3	12.4	31	5.6	6.8
Cumberland River:						
Nashville, Tenn.....	40.0	3	20.3	30	3.9	16.4
Tennessee River:						
Chattanooga, Tenn.....	33.0	1	6.6	22, 23, 24	4.6	2.0
Monongahela River:						
Pittsburg, Pa.....	29.0	1	10.7	23	2.2	8.5
Savannah River:						
Augusta, Ga.....	32.0	13	8.8	24, 30, 31	6.0	2.8
Sacramento River:						
Sacramento, Cal.....		1	20.5	16, 17, 18	18.0	2.5
Willamette River:						
Portland, Oregon.....		31	21.2	1	10.5	10.7

Hudson River.—Albany, N. Y.: from the 17th of April until the 1st of the current month the river rose steadily, and at

noon of the latter date was thirteen feet above low-water mark. On the 2d, 3d, and 4th the water receded slowly, but rose slightly on the 5th.

Mississippi River.—Cairo, Ill.: the river at this point reached its highest stage, 39.3 feet above low water, on the 2d; from the 2d until the 18th it fell slowly to 25.0 feet; from the 18th to 21st it rose .4 foot; from the 21st to the end of the month it fell steadily, being on the 31st 17.6 feet above low-water mark.

Cumberland River.—Nashville, Tenn.: the river was at its greatest height on the 3d. After the 3d it fell steadily, and at the end of the month was only 3.9 feet above low-water mark.

Lake Superior.—Duluth, Minn.: the lake at this port was filled with broken ice until the 9th, when it moved out before a northwesterly wind. Navigation opened on the 6th; on this date the propeller "Spokane" arrived from Buffalo, N. Y., and the "Jas. Fisk, jr." departed.

Marquette, Mich.: on the 1st the broken ice in the harbor was driven out by a strong southwest wind. On the 2d several vessels left for ports on the lower lakes.

Fort Totten, Dak., 7th: the navigation on Devil's Lake opened to-day. The steamer "Minnie H.," Capt. E. E. Herrman, made the first trip of the season.

Fort Smith, Ark., 31st: the river has remained higher this month than it has been since January. Copious rains fell both at this point and above here on the river.

FLOODS.

Augusta, Me.: at the beginning of the month the rivers in Maine, swollen by the heavy rains of the last two days of April and the consequent melting of the large amount of snow in the forests, were unusually high. On the 1st the Kennebec and its branches were at flood height; in the vicinity of Augusta the river was about twelve feet above its average height, and flowing swiftly. All cellars and basements in the lower part of the city were flooded. In the surrounding country great damage was done; many bridges were carried away, roads